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PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Hasper et al.

) Group Art Unit 3652

Appl. No. : 09/807,580

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) PATENTS, Commissioner for Patents, P.O. Box 1450,
) Alexandria, VA 22313-1450, on

Filed : April 13, 2001

For : SORTING/STORAGE DEVICE
FOR WAFERS AND METHOD
FOR HANDLING THEREOF

) December 23, 2003
) (Date)
) Adeel Syed Akhtar
) Adeel S. Akhtar, Reg. No. 41,394

Examiner : Charles A. Fox

ON APPEAL TO THE BOARD OF PATENT APPEALS AND INTERFERENCES
APPELLANTS' BRIEF

MAIL STOP APPEAL BRIEF - PATENTS
COMMISSIONER FOR PATENTS
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Alexandria, VA 22313-1450

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Dear Sir:

This Appeal Brief relates to an appeal to the Board of Patent Appeals and Interferences of the final rejection set forth in an Office Action mailed May 27, 2003 in the above-captioned application.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is the assignee of this application, ASM International N.V.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

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III. STATUS OF THE CLAIMS

The above-captioned application was filed on April 13, 2001 with Claims 1-7. Simultaneously with the filing of the application, Claims 1-7 were cancelled and Claims 8-14 were added. During the course of prosecution, Claim 15 was added and Claim 10 was cancelled. Claims 8-9 and 11-15 are thus pending in the present application, and were finally rejected in the Office Action mailed May 27, 2003. The final rejection was affirmed in an Advisory Action mailed October 22, 2003.

Accordingly, Claims 8-9 and 11-15 are the subject of this appeal. These claims are attached hereto as Appendix A.

IV. STATUS OF AMENDMENTS

The claims before the Board appear as they were finally rejected. As noted above, these pending claims are attached hereto as Appendix A.

V. SUMMARY OF THE INVENTION

The claimed invention relates generally to a device (1) for sorting semiconductor wafers which are stored in cassettes (18, 19) and, more particularly, to a device (1) having a housing (2), a wafer handling device (24), a sealable chamber (22) and a measuring station (16), all arranged in a particular manner. Advantageously, the individual features of the device (1) interrelate in a way to provide a very particle-free environment for wafers, while at the same time minimizing the volume of this expensive and difficult to maintain environment.

Semiconductor wafers can be processed batchwise to form integrated circuits. Test wafers, for evaluating process results, and end wafers, for filling out a batch of wafers, are customarily included in processing batches of wafers. Such processing typically involves using several different devices. For example, because test and end wafers do not typically undergo further processing, sorting devices are used to separate them from the other wafers of a batch. Also, to evaluate process results, *e.g.*, by measuring test wafers, measuring stations are also typically used. To prevent contamination of the wafers, the sorting devices and measuring stations are generally housed in separate particularly particle-free environments, each of which is independently maintained pure. In addition, while the clean room in which the cassettes are stored generally has

less stringent purity requirements than the sorting device or the measuring station, a poor separation between the clean room and the sorting device or measuring station may dictate that the clean room have a higher purity atmosphere than otherwise needed. *See*, the Specification, p. 1-2.

The claimed invention advantageously provides a particular arrangement of components which allow the purity demands of the clean room to be reduced while also advantageously reducing the number of very particle-free environments that must be maintained. *See*, the Specification, p. 1-2. A wafer handler (24) for sorting wafers is provided in a sealable chamber (22), which is preferably provided in a device (1) having a housing (2). The sealable chamber (22) can interface with at least two cassettes (18, 19), allowing the wafer handler (24) to have access to those cassettes (18, 19). Because a single wafer handler (24) can access both cassettes (18, 19), only one wafer handler (24) is needed, and the wafer handler (24) can transfer wafers directly from one cassette to the other in a sorting function. *Id.* at pp. 4-6. In addition, the wafer handler (24) is centrally arranged in that it can access or communicate with both the cassettes (18, 19) and a measuring station (16). Thus, both wafer measurement and sorting can be accomplished while a cassette (18 or 19) is open to the sealable chamber (22). *Id.* at pp. 2-5.

This arrangement minimizes the volume of the very particle-free environment that must be maintained, and makes providing entirely separate atmospheres for both the sorting device (24) and the measuring device (16) unnecessary. Advantageously, by keeping the wafers housed inside the cassettes (18, 19) during sorting, the volume of the sealable chamber (22) is reduced. In addition, transport of a cassette (18 or 19) to another location or the need for additional seals and locking mechanisms for additional cassettes (18 or 19) or further wafer movement is obviated. This further reduces the costs and complexity of processing. Moreover, the ability to have all the wafers of a cassette (18, 19) open and accessible at the same time increases the available options for sorting the wafers. *Id.* at p. 2. Thus, this arrangement, in a sealable chamber (22), of a wafer-handler (22) which is able to access at least two wafer cassettes (18, 19) and a measuring station (16) both minimizes the volume of the very particle-free environment and also increases wafer sorting flexibility.

This advantageous arrangement is reflected in the claims, which recite a common wafer handling device that is able to sort wafers by transferring them directly between two cassettes and to also transfer wafers to a measuring station. In addition, each claim includes the limitation

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of a wafer handling device in a “sealed” chamber or a chamber configured to be “sealed off” with respect to a housing.

VI. ISSUES BEFORE THE BOARD

The sole issue before the Board in this appeal is whether Claims 8-9 and 11-15 are properly rejected under 35 U.S.C. § 103(a) as being unpatentable over Muka (U.S. Pat. No. 6,079,927) in view of Cheng (U.S. Pat. No. 6,164,894) and Allen (U.S. Pat. No. 6,213,708 B1).

VII. GROUPING OF CLAIMS

For purposes of the present appeal, all the pending claims stand and fall together. Each claim recites a similar arrangement of components.

Appellants reserve the right, however, to separately argue, in subsequent continuing applications, the patentability of the various dependent features not addressed herein.

VIII. APPELLANTS’ ARGUMENT

In the final Office Action mailed May 27, 2003, the Examiner rejected all of the pending claims as being unpatentable under 35 U.S.C. §103(a). Each rejection is based upon the combination of Muka, Cheng and Allen, together or in further combination with other references.

The Examiner has asserted Muka for teaching an apparatus having, *inter alia*, a cassette store, a sealable chamber and a cassette-handling device. Cheng has been asserted for teaching a measuring station and Allen has been asserted for teaching a wafer sorting device.

As a motivation to combine these references, the Examiner has stated that it would have been obvious to combine Muka, Chen and Allen essentially for the purpose of increasing processing throughput. In particular, the Examiner has stated that it would have been desirable to provide measuring and sorting capabilities to Muka’s device “to test wafers and to sort them after testing in order to keep the process station from processing defective wafers, thereby increasing the throughput of the system by avoiding the processing of defective wafers.” The Examiner further stated that it would have been obvious to “test the wafers automatically after processing, therein making the process faster and more precise” and that it would have been obvious to “sort the wafers into various groups based upon their being defective or operable.” In

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addition, in the Advisory Action mailed October 22, 2003, the Examiner stated that Allen also provides a suggestion to combine the references by teaching that its wafer transfer device may be combined with “any semiconductor processing tool.”

A. Even if proper, the combination of the art of record does not teach all the elements of the claims.

Regarding the Examiner’s assertions, Applicants do not argue here that Muka, Cheng, and Allen lack the features discussed above. Rather, even assuming that the prior references are properly combined and that the prior art teaches all the asserted individual components of the claims, Applicants submit that the art of record does not establish a *prima facie* case of obviousness because the prior art does not teach or suggest each limitation of the claims. See M.P.E.P. § 2143.03 (stating that “to establish *prima facie* obviousness of a claimed invention, ***all*** the claim limitations must be taught or suggested by the prior art.”) (emphasis added) (citing *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974)).

In particular, it is well-established that not only must the prior art teach all the components recited in the claims, but the prior art must also teach or suggest arranging these components in the ***particular manner*** claimed. See *In re Kotzab*, 55 U.S.P.Q. 2d 1313, 1318 (Fed. Cir. 2000) (“particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination ***in the manner claimed***.”) (emphasis added); see also, *In re Newell*, 891 F.2d 899, 13 U.S.P.Q.2d 1248, 1250 (Fed. Cir. 1989) (“some teaching or suggestion which supports the selection and use of the various elements in the ***particular claimed combination***” must be shown to establish obviousness) (emphasis added).

As noted above, Applicants have developed a device and method having a particularly advantageous arrangement for performing wafer sorting and wafer measuring. Applicants’ arrangement provides a single “wafer-handling device” that can both “sort” and “transfer wafers directly between cassettes” and that also can “access[]” or “transfer[] wafers to and from” “a measuring station.” See independent Claims 8, 13 and 15. In addition, the wafer-handling device is inside a “sealed chamber” to minimize the area needed for performing wafer sorting and measuring and the volume of the very particle-free environment that must be maintained. Advantageously,

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this “sealed chamber” reduces the purity demands placed on the clean room environment, while allowing a particularly clean environment to be maintained for wafers in the sealed chamber.

Given these claim limitations, Applicants submit that neither the art of record nor the Examiner’s asserted motivation to combine the references teaches or suggests Applicants’ claimed arrangement of components. For example, the prior art does not explicitly teach any particular way to arrange the disparate components of those references. In particular, Muka only teaches a cassette store and sealed chamber with various ancillary features, Allen only teaches a wafer sorter and Chen only teaches a measuring station. None of these references, however, discusses how to integrate these individual components together.

In addition, apart from the teachings of the prior art, the Examiner’s own asserted motivations to combine, even if proper, also do not give a combination meeting all the claim limitations. For example, while the Examiner has pointed to Allen as providing a suggestion to combine the references to arrive at Applicants’ claimed invention, Allen only teaches that its wafer sorter *may* be used with other semiconductor processing tools; Allen does not teach a particular arrangement of interfacing its sorter with these other tools. *See* Allen, Col. 1, lines 54-57 (“The present wafer sorter system may be used in conjunction with any semiconductor processing tool, or can be used within a processing sequence separate from a processing tool.”) Thus, this asserted suggestion to combine also does not teach or suggest any particular arrangement of components, let alone Applicants’ specifically claimed arrangement.

Moreover, the rationale provided by the Examiner for combining the references also does not provide a suggestion to arrange the various components as Applicants have claimed. Rather, the Examiner’s asserted rationale states little more than that it would have been desirable to provide measuring and sorting capabilities to a factory having Muka’s apparatus. In particular, the Examiner has stated that testing and sorting wafers in conjunction with Muka’s apparatus would be desirable for increasing throughput by preventing processing of defective wafers:

[i]t would have been obvious to one of ordinary skill in the art, at the time of the invention to provide the measuring station capabilities as taught by Cheng and the sorting capabilities taught by Allen to the device taught by Muka in order to allow the device to test wafers and to sort them after testing in order to keep the process station from processing defective wafers, thereby increasing the throughput of the system by avoiding the processing of defective wafers ... it would have been obvious to test the wafers automatically after processing, therein making the

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process faster and more precise ... [and] that it would have been obvious... to sort the wafers into various groups based upon their being defective or operable.

See the Office Action, May 27, 2003, pp. 3-4. These statements, however, indicate only that a processing factory should have all these functions, but does not indicate that all these functions should be accomplished in one tool or housing, to say nothing of particularly arranging a wafer handling device capable of sorting wafers, a measuring station and a sealable chamber in a housing with respect to one another, as recited in Applicants' claims. Rather, Applicants note that the goals articulated by the Examiner could be accomplished with separate tools (one each for processing, sorting and measuring), arranged side by side, each tool with its own wafer handler. Thus, even assuming the Examiner's statements to be true, they do not particularly suggest Applicants' claimed arrangement and, so, do not satisfy the Examiner's burden. See *In re Dembiczak*, 175 F.3d 994, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999) (a suggestion to combine references must be supported by "clear and particular" evidence, "broad conclusory statements regarding the teaching of multiple references, standing alone, are not 'evidence'" sufficient to support an obviousness rejection).

Consequently, it is important to note that Applicants have not simply claimed wafer sorting and measuring in an apparatus such as Muka's; rather, the claims specify a particular interrelationship between a wafer handling device, a measuring station, cassettes and a sealable chamber. Thus, while the asserted rationale may provide a motivation to provide measuring and sorting capabilities within the same fabrication facility as Muka's apparatus, it does not suggest an arrangement of the components for performing this measuring and sorting.

Accordingly, even assuming that the art of record teaches all that has been asserted by the Examiner and even assuming that the Examiner's asserted rationale for combination is proper, Applicants submit that the art of record does not teach or suggest the particular arrangement recited in Claims 8-9 and 11-15. Consequently, Applicants submit that the Examiner has not established a *prima facie* case of obviousness.

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B. The art of record does not provide the necessary suggestion to combine the references.

To establish a *prima facie* case of obviousness, the prior art itself must provide a suggestion to combine the cited references in the manner claimed. *See In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991) (To establish a *prima facie* case of obviousness, a suggestion to combine references must be founded in the prior art, not in the applicant's disclosure.); *see also In re Dance* 160 F.3d 1339, 48 U.S.P.Q.2d 1635 (Fed. Cir. 1998) ("it is the prior art itself, and not the applicant's achievement, that must establish the obviousness of the combination.").

Applicants submit that the art of record contains no suggestion for combining the various components discussed above. In particular, the only suggestion asserted by the Examiner as coming from the prior art is the above-discussed statement from Allen. That statement, however, merely teaches that Allen's wafer sorter may be combined with other tools. It does not teach or suggest which tools may be desirable for combination with the wafer sorter, nor how to arrange such a combination. The other art of record also does not suggest which tools may be combined with Allen. Given this silence, Applicants submit that the prior art does not provide the requisite suggestion to combine Allen, Muka and Cheng. *See* M.P.E.P. § 2143.01 ("the mere fact that references can be combined or modified does not render the resultant combination obvious, unless the prior art also suggests the *desirability* of the modification.") (emphasis added) (citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990)).

In view of these deficiencies of the prior art, Applicants submit that the suggestion to combine in the manner claimed comes only from the Examiner in hindsight. As discussed above, the Examiner has asserted that the skilled artisan would be motivated to form a device with the advantages of Applicants' invention because he would find it desirable to provide measuring and sorting capabilities to Muka's device. It is well-established, however, that the Examiner's subjective motivation for combining references is not a permissible substitute for evidence from the prior art. *See In re Lee*, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002) (the "factual question of motivation is material to patentability, and could not be resolved on subjective belief and *unknown authority* ... 'Common knowledge and common sense,' even if assumed to derive from the agency's expertise, do not substitute for authority when the law requires authority.") (emphasis added). In this case, the prior art, and Allen in particular, teaches little more than that Allen can be combined with other

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references. The Examiner has not provided any teaching from the *prior art*, however, that suggests Applicants' particular claimed combination and particular claimed arrangement.

Given the lack of any particular suggestion in the prior art, Applicants submit that the Examiner has impermissibly combined the various components disclosed by the cited references in hindsight, based upon Applicants' disclosure. In particular, in the present case, the only discussion of record of why the various components of the prior art should be combined comes from Applicants' disclosure. It is well-established, however, that it is "impermissible ... simply to engage in a hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps." *See In re Gorman*, 933 F.2d 982, 18 U.S.P.Q.2d 1885 (Fed. Cir. 1991)).

Accordingly, because the prior art does not provide a suggestion to make the particular claimed combination, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness for this reason also.

C. Conclusion

The Examiner has not established a *prima facie* case of obviousness. Applicants have claimed a particular arrangement of components, with a wafer handling device located in a sealable chamber that can both sort wafers directly between two or more cassettes and can also access a measuring station. The prior art, however, provides no suggestion to arrange these elements in the claimed manner. Rather, the only particular motivation to combine the various elements impermissibly comes from the Examiner himself. In addition, even assuming that all the Examiner's assertions are true, the Examiner still has not provided any suggestion for making the particular arrangement claimed by Applicants.

In view of these deficiencies, Appellants respectfully submit that the Examiner's rejection of Claims 8, 9 and 11-15 are improper and should be withdrawn.

IX. APPENDIX A

Attached hereto is a copy of the finally rejected claims that are the subject of this appeal.

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X. APPENDIX B

Attached hereto are copies of Muka (U.S. Pat. No. 6,079,927), Cheng (U.S. Pat. No. 6,164,894) and Allen (U.S. Pat. No. 6,213,708 B1), the references cited by the Examiner in all rejections.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: December 23, 2003

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APPENDIX A

1-7. (Cancelled).

8. (Previously Presented) A device for sorting wafers stored in cassettes comprising:

a housing;

a wafer handling device arranged in a chamber configured to be sealed off with respect to the housing, wherein the wafer-handling device accesses a measuring station;

a part for receiving at least two closable cassettes arranged in the housing and separated from said chamber by a partition, said part configured to position a received cassette against a closable opening in said partition, wherein through opening of said closable opening said closable cassette is opened and placed in communication with said chamber so that said wafer handling device can remove wafers from the cassette or position them therein;

a store for closable cassettes arranged in the housing; and

a handling device for closable cassettes arranged in the housing, wherein the store for closable cassettes and the handling device for closable cassettes are separated from the part for receiving at least two cassettes, and wherein the wafer-handling device is adapted to transfer the wafers directly between cassettes in a sorting function.

9. (Previously Presented) The device of Claim 8, wherein the device is configured for sorting wafers stored in FOUPs.

10. (Canceled).

11. (Previously Presented) The device of Claim 8, wherein the part for receiving at least two cassettes comprises a turntable.

12. (Previously Presented) The device of Claim 8, wherein the store for cassettes comprises a rotatable magazine.

13. (Previously Presented) A method for assembling a batch of wafers in cassettes comprising the steps of:

placing at least a first and a second closed cassette in a store;

employing a cassette handling device to select and move the first cassette from the store to a sorting operation, wherein the first cassette is opened and placed in active connection with a wafer handling device in a chamber;

employing a cassette handling device to select and move a second cassette from the store to a sorting operation, wherein the second cassette is opened and placed in active connection with said wafer handling device in said chamber;

transferring wafers to and from a measuring station with the wafer-handling device, the measuring station connected to the chamber; and

employing said wafer-handling device to sort the wafers by transferring wafers directly between the first cassette and the second cassette, wherein the chamber is sealed.

14. (Previously Presented) The method of Claim 13, further comprising the step of testing the wafers during sorting the wafers.

15. (Previously Presented) A method for assembling a batch of wafers in cassettes comprising the steps of:

placing at least a first and a second closed cassette in a store;

employing a cassette handling device to select and move a first cassette from the store to a first closable opening in a sealed chamber;

opening said first closable opening together with said first cassette;

employing a cassette handling device to select and move a second cassette from the store to a second closable opening in said sealed chamber;

opening said second closable opening together with said second cassette; and

employing a wafer-handling device, provided in said sealed chamber, to transfer wafers to and from a measuring station communicating with said sealed chamber and to sort the wafers by transferring wafers directly between the first cassette and the second cassette.